

LAST CALL

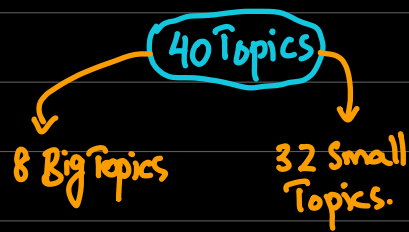
No Recordings are available

↳ OBS studio (software to record class)

class notes will be uploaded daily on LMS.

Don't copy notes during class.

Must copy everything after class. (To memorize)



Month 1: Small Topics

2: Big Topics

3: Small/medium Topics.

O LEVELS (4024)

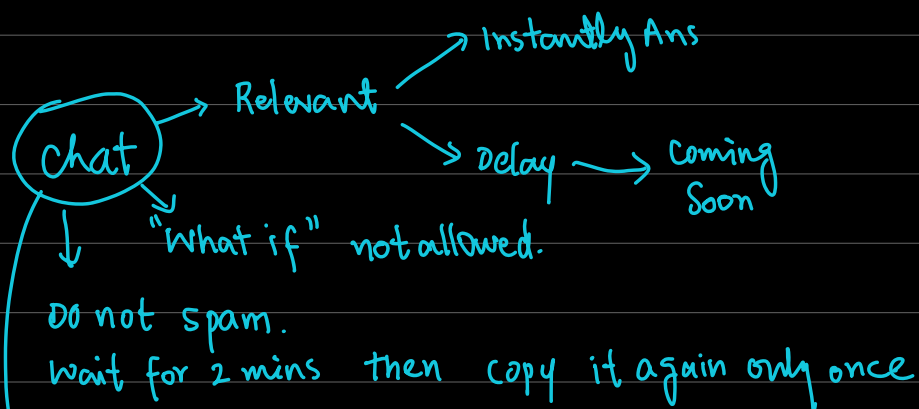
IGCSE(0580)

P1 2h Small Questions
No calculator

P2 2h Small Questions
No calculator

P2 2h Big Questions
Calculator Allowed.

P4 2h Big Questions
Calculator Allowed.



dmn - Question
dnt mention name

Grade 6 - 11
Prereq: (6 years)

MUST MEMORIZE MENTAL MATHS

TABLES till 10 and Table of 25 → Percentages

25 125
50 150
75 175
100 200

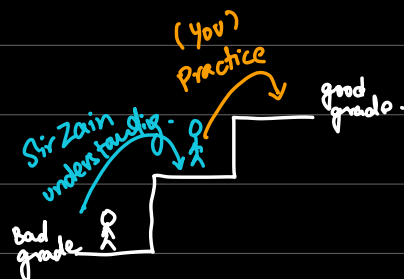
Candidates should be able to recall

SQUARE

$1^2 = 1$	$11^2 = 121$
$2^2 = 4$	$12^2 = 144$
$3^2 = 9$	$13^2 = 169$
$4^2 = 16$	$14^2 = 196$
$5^2 = 25$	$15^2 = 225$
$6^2 = 36$	$16^2 = 256$
$7^2 = 49$	$17^2 = 289$
$8^2 = 64$	$18^2 = 324$
$9^2 = 81$	$19^2 = 361$
$10^2 = 100$	$20^2 = 400$

CUBES

$1^3 = 1 \times 1 \times 1 = 1$	
$2^3 = 2 \times 2 \times 2 = 8$	
$3^3 = 3 \times 3 \times 3 = 27$	
$4^3 = 64$	
$5^3 = 125$	
$6^3 = 216$	
$7^3 = 343$	
$8^3 = 512$	
$9^3 = 729$	
$10^3 = 1000$	



(ARITHMETICS)

(5 Marks)

- ✓ 1 - BODMAS.
- ✓ 2 - FRACTIONS
- ✓ 3 - DECIMALS.
- ✓ 4 - DIFFERENCE + MIDDLE VALUE
- ✓ 5 - NUMBER FAMILIES.
- ✓ 6 - ADDITION SUBTRACTION RULES
- 7 - Converting RECURRING DECIMALS $\iff$ FRACTION

BODMAS

1) $18 - 2 \times 3 + 4$

$18 - 6 + 4$

$18 - 2$

16

Common Blunder!

$18 - 6 + 4$

$18 - 10$

8 (wrong)

2) 3×2^3

multiply first $6^3 = 216$ (wrong)

power first $3 \times 8 = 24$ (correct)

3) 2×5^x

multiply first 10^x (wrong)

(Indices)

$\boxed{Q} \rightarrow 2 \times 5^x = 50$

$5^x = \frac{50}{2}$

$5^x = 25$

$5^x = 5^2$

$x = 2$

4) $\sin 30 \times 2$
 multiply first : $\sin 60$ Wrong.

$2 \sin 30$ (correct)

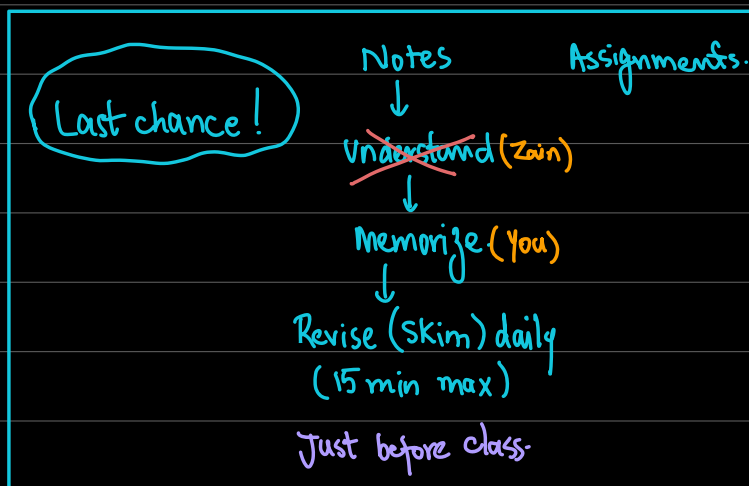
5) $\sin x \times 3$

$\sin 3x$ (Wrong)

$3 \sin x$ (Correct)

BODMAS
 Brackets
 operators
 1- power
 2- sin
 3- cos
 4- tan

ADD / SUB	MULTIPLY / DIVIDE				
Same sign $\rightarrow$ ADD } Sign of opp sign $\rightarrow$ SUB } Bigger no	<table> <tr> <td>$++ = +$</td><td>$+- = -$</td></tr> <tr> <td>$-- = +$</td><td>$-+ = -$</td></tr> </table>	$++ = +$	$+- = -$	$-- = +$	$-+ = -$
$++ = +$	$+- = -$				
$-- = +$	$-+ = -$				
$-3 + 5 = +2$	$-2 \times 3 = -6$				
$-2 - 9 = -11$	$\frac{-6}{-3} = +2$				
$-2x + 12x = +10x$	$(-5) \times (-3) = +15$				
$-4y - 12y = -16y$	$\frac{4}{-2} = -2$				
$-21 + 5 = -16$					
$4 - 18 = -14$					
$-3 - 11 = -14$					



FRACTIONS → Vectors

ADD / SUB (Rule: Make denominator same).

$$\frac{3}{4} + \frac{1}{5}$$

$$\frac{15 + 4}{20} = \frac{19}{20}$$

$$\frac{5 \times 3}{5 \times 4} + \frac{1 \times 4}{5 \times 4}$$

$$\frac{15}{20} + \frac{4}{20} = \frac{15 + 4}{20} = \frac{19}{20}$$

② $\frac{3}{4} + \frac{7}{2} \times 2$

$$\frac{3}{4} + \frac{14}{4}$$

$$\frac{3 + 14}{4} = \frac{17}{4}$$

③ $\frac{5}{2x} + \frac{3}{x} \times 2$

$$\frac{5}{2x} + \frac{6}{2x}$$

$$\frac{5 + 6}{2x} = \frac{11}{2x}$$

$$\textcircled{3} \quad \frac{3}{2x} + \frac{4}{3x+1}$$

$$\frac{3(3x+1) + 4(2x)}{2x(3x+1)}$$

$$\frac{9x+3+8x}{2x(3x+1)} = \frac{17x+3}{2x(3x+1)}$$

→ No need to open
> brackets in denominators.
They are simplified this way.

MULTIPLY

$\begin{pmatrix} \square \\ \square \end{pmatrix}$

$$\textcircled{1} \quad \frac{3}{5} \times \frac{2}{7} = \frac{6}{35}$$

$$2 \frac{\begin{pmatrix} 3 \\ 5 \end{pmatrix}}{1} = \frac{6}{5}$$

$$2 \frac{\begin{pmatrix} 2x+1 \\ 3 \end{pmatrix}}{1} = \frac{4x+2}{3}$$

FRACTIONS	VECTORS
Six over five	Six and five
$2 \frac{\begin{pmatrix} 6 \\ 5 \end{pmatrix}}{1}$	$2 \begin{pmatrix} 6 \\ 5 \end{pmatrix}$
$\boxed{\frac{12}{5}}$	$\begin{pmatrix} 12 \\ 10 \end{pmatrix}$

This correction will fix Two chapters.
(vectors) (Algebra).

DIVIDE

Solve leaving your answer as improper fraction.

$$\frac{3}{5} \div \frac{4}{7}$$

keep flip change

$$\frac{3}{5} \times \frac{7}{4}$$

$$\frac{21}{20}$$

PROPER
 $N < D$

$$\frac{2}{5}, \frac{3}{7}$$

IMPROPER
 $N \geq D$

$$\frac{3}{2}, \frac{5}{5}$$

IMPROPER



Mixed

$$\frac{11}{9}$$

LONG
DIVISION

$$\begin{array}{r} 1 \\ 9 \overline{) 11} \\ \underline{-9} \\ 2 \end{array}$$

Diagram showing the conversion of the remainder 2 to a fraction $\frac{2}{9}$ and adding it to the whole number 1 to get the mixed number $1\frac{2}{9}$.

Mixed



IMPROPER

$$3\frac{2}{5} = \frac{17}{5}$$

$\frac{4.5}{3}$ ✗ Mixture of decimal and fraction
hence we cannot leave as
final Answer.

$$\frac{3}{2} \longrightarrow 1\frac{1}{2} \longrightarrow 1.5$$

If Question is silent, all of these are correct.

oe = or equivalent forms.

DECIMALS

→ (STANDARD FORM) (SIG FIGS)

ADD/SUB : Rule decimal beneath decimal.

① $12.35 + 6.4$

12.35	12.35
$+ 6.4$	$+ 06.40$
Wrong	18.75
	Correct

② $12.35 - 6.4$

12.35
$- 06.40$
5.95

MULTIPLY

$$\textcircled{1} \quad \underset{2dp}{0.02} \times \underset{1dp}{1.6} = \underset{= 3dp}{0.032}$$

$$\underset{1dp}{2.4} \times \underset{3dp}{0.003} = \underset{4dp}{0.0072} \quad \begin{array}{r} 24 \\ \times 3 \\ \hline 72 \end{array}$$

$$\underset{no\ dp}{9} \times \underset{1\ dp}{0.3} = \underset{= 1dp}{2.7}$$

DIVIDE (choose one method and stick to it)

Method 1

If numerator and denominator has same decimal places, the decimal is cancelled.

$$\textcircled{1} \quad \frac{\cancel{0}.6}{\cancel{0}.4} = \frac{16}{4} = 4$$

$$\textcircled{2} \quad \frac{\cancel{0}.32}{\cancel{0}.20} = \frac{\cancel{32}^{16}}{\cancel{20}_{10}} = \frac{16}{10} = 1.6$$

$$\textcircled{3} \quad \frac{\cancel{6}.3}{9.\cancel{0}} = \frac{\cancel{63}^7}{90_{10}} = \frac{7}{10} = 0.7$$

Method 2

$$\textcircled{1} \quad \frac{1.6 \times 10}{0.4 \times 10} = \frac{16}{4} = 4$$

$$\textcircled{2} \quad \frac{0.32 \times 100}{0.2 \times 100} = \frac{\cancel{32}^{16}}{\cancel{20}_{10}} = \frac{16}{10} = 1.6$$

$$\textcircled{3} \quad \frac{6.3 \times 10}{9 \times 10} = \frac{63}{90} = \frac{7}{10} = 0.7$$

9.0 is same as 9

0.9 is not same as 9

$\frac{1234}{10} = 123.4$	$\frac{1234}{1000} = 1.234$
$\frac{1234}{100} = 12.34$	$\frac{7}{10} = 0.7$

In NON
CALCULATOR

Tactic for decimal.

eg: $\frac{24 \div 4}{40 \div 4} = \frac{6}{10} = 0.6$

$$\frac{2 \times 2}{5 \times 2} = \frac{4}{10} = 0.4$$

We want to make
denominator 10/100/1000
So that we can
quickly convert to
decimal.

$$\frac{3 \times 4}{25 \times 4} = \frac{12}{100} = 0.12$$

$$\frac{7 \times 5}{20 \times 5} = \frac{35}{100} = 0.35$$

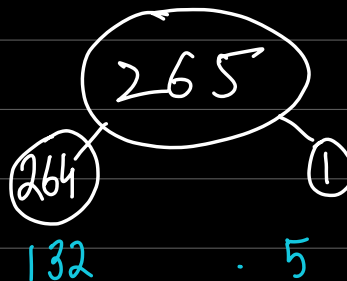
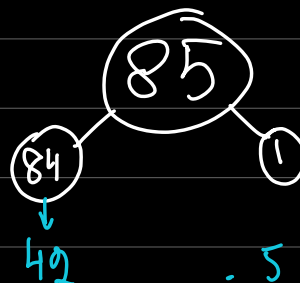
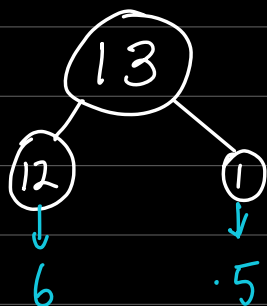
$$\frac{7 \div 2}{20 \div 2} = \frac{3.5}{10} = 0.35$$

In NON
CALCULATOR

Half Any number mentally.

24
↓ ↓
1 2

48
↓ ↓
2 4



MEMORIZE THESE!

$$\frac{1}{2} = 0.5$$

$$\frac{1}{5} = 0.2$$

$$\frac{1}{4} = 0.25$$

$$\frac{3}{4} = 0.75$$

$$12 \times 0.75 = 9$$

$$25 \times 0.2 = 5$$

DIFFERENCE

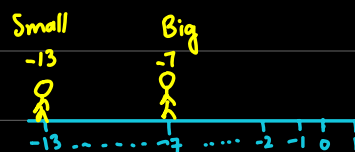
Arithmetics + STATS + Algebraic Scenario.

Difference is always Positive.

$$\text{DIFFERENCE} = \text{Bigger} - \text{Smaller}$$

Q. Find difference between
-7 and -13

$$\begin{aligned}\text{Difference} &= \text{Big} - \text{Small} \\ &= (-7) - (-13) \\ &= -7 + 13 \\ &= +6\end{aligned}$$



For sciences only:

$$\text{Change} = \text{final} - \text{initial}$$

Change can have a negative value.

$v=5$

Before

$v=1$

After.

$$\begin{aligned}\text{Change} &= \text{final} - \text{initial} \\ &= 1 - 5 = -4 \text{ m/s}\end{aligned}$$

Midway / Halfway value

Arithmetic
+ STATS.

Q. Find the decimal value that lies exactly halfway of 3.7 and 5.3

Step1: ADD

Step2: $\div 2$

$$\text{Step1: } 3.7 + 5.3 = 9$$

$$\text{Step2: } 9 \div 2 = 4.5$$

$$\begin{array}{r} 3.7 \\ + 5.3 \\ \hline 9.0 \end{array}$$

Q. Find fraction that is exactly halfway of $\frac{1}{7}$ and $\frac{4}{7}$

Step1: Add

$$\frac{1}{7} + \frac{4}{7} = \frac{5}{7}$$

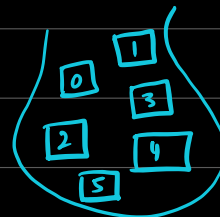
Step2: divide by 2

$$\frac{5}{7} \div 2 = \frac{5}{7} \times \frac{1}{2} = \boxed{\frac{5}{14}}$$

NUMBER FAMILIES

Grade 11 (Set Notation)

(Probability)



NO DECIMAL OR FRACTIONS.

1 NATURAL : 1, 2, 3, 4, 5....
NUMBERS

2 WHOLE : 0, 1, 2, 3, 4....
NUMBERS

Examiner's Fav Word.

3 INTEGERS (Any number without decimal or fraction)

.... -4, -3, -2, -1, 0, 1, 2, 3, 4....

4 EVEN NUMBERS (leaves No remainder when divided by 2)



0, 2, 4, 6, 8, 10....

$$\begin{array}{r} 0 \\ 2 \overline{) 0} \\ - 0 \\ \hline 0 \text{ Remainder} \end{array}$$

5 ODD NUMBERS (Jo even nahi hotay)

1, 3, 5, 7, 9....

6 PRIME NUMBERS Exactly two factors

①
1
Not prime

②
1 2

③
1 3

⑤
1 5

⑦
1 7

7

COMPOSITE NUMBERS

More than 2 factors

①
not composite

④
1 2 4

⑩
1 2 4 5 10

'Zero' and 'One' do not belong to Prime/Composite family ☹

FACTORS

1, 2, 3, 4, 6,

⑫

24, 36, 48, 60, ...

↓
12 is both a factor and multiple of itself.

MULTIPLES

π , $\frac{22}{7}$, 3.142 are all completely different numbers.



They are just really close to each other.

RATIONAL	IRRATIONAL
can be written as a ^{No decimal.} <u>pure</u> fraction = $\frac{p}{q}$	Cannot be written as a pure fraction.
a) $0.3 = \frac{3}{10}$ ✓	Irrational numbers are of 3 types.
b) $0.0005 = \frac{5}{10000}$ ✓	1- π (symbol only)
c) $3.142 = \frac{3142}{1000}$ ✓	2- $\sqrt{\square}$ not exact $\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{6}$ etc
d) $\frac{22}{7}$ ✓	3- $\sqrt[3]{\square}$ not exact $\sqrt[3]{2}, \sqrt[3]{3}, \sqrt[3]{4}$ etc.
e) $-6 = -\frac{6}{1}$ ✓	<u>WHY is π irrational:</u>
f) $\sqrt{16} = 4 = \frac{4}{1}$ ✓	$0.123456 = \frac{123456}{1000000}$
g) Recurring Decimals are rational.	$0.123456789 = \frac{123456789}{1000\ 000\ 000}$
h) $\frac{1.2 \times 10}{3 \times 10} = \frac{12}{30}$ ✓	$\pi = 3.14159 \dots$ ↓ Decimals keep on going without a pattern
Any decimal number you can write is always a Rational Number	We do not know how many zeros to put in denominator to convert to fraction.

RECURRING DECIMALS

$$0.\dot{3} = 0.333333 \dots$$

$$0.12\dot{5} = 0.125555 \dots$$

$$0.1\dot{3}6 = 0.1363636 \dots$$

$$0.\dot{1}2\dot{3} = 0.123123123 \dots$$

Maths ppl have a very
clever way to convert
Recurring decimals to
fractions. eg

$$0.\dot{3} = 0.333 \dots = \frac{1}{3}$$

Q:

$$\frac{22}{7}$$

, π ,

$$3\sqrt{2}$$

$$,$$
 $\sqrt{2} \times \sqrt{8}$

$$\sqrt{2 \times 8}$$

$$\sqrt{16} = 4 = \frac{4}{1}$$

Rational.

Circle the irrational ones.

Q: Write down an irrational number between 3 and 4.

$\sqrt{10}, \sqrt{11}, \sqrt{12}, \sqrt{13}, \sqrt{14}, \sqrt{15}$
All of these are irrational.

$\sqrt{9}$
Rational

$\sqrt{16}$
Rational

Ans: π

$\sqrt{15}$

Any one of these

Q: Write down an irrational number between 1 and 2

$\sqrt{2}, \sqrt{3}$
These are irrational

$\sqrt{1}$
Rational

$\sqrt{4}$
Rational

Ans:

$\sqrt{2}$

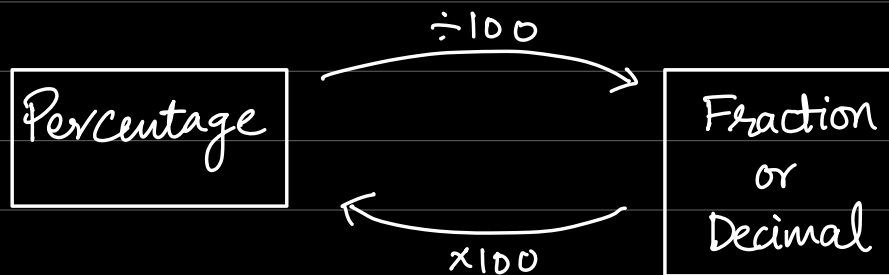
Q: Write down an irrational number between 7 and 8.

$\sqrt{50}, \sqrt{51}, \dots, \sqrt{63}$
all of these are

$\sqrt{49}$

$\sqrt{64}$

Rational | irrational | Rational Ans: $\sqrt{58}$



Q. (i) Express 8% as decimal = $\frac{8}{100} = 0.08$

(ii) Express 40% as fraction in lowest form:

$$\frac{40}{100} = \frac{4^2}{10^2} = \frac{2}{5}$$

(iii) Express $\frac{3}{4}$ as a percentage.

$$\frac{3}{4} \times \frac{25}{100} = 75\%$$

(iv) Express 0.12 as Percentage.

$$0.12 \times 100 = 12\%$$

Memorize THESE.

$$\frac{1}{2} = 0.5$$

$$\frac{1}{5} = 0.2$$

$$\frac{1}{4} = 0.25$$

$$\frac{3}{4} = 0.75$$

To arrange, convert each number to decimal with 1 more dp than given in the question.

21 Arrange these values in order of size, starting with the smallest.

$$\frac{9}{20} \quad \frac{9 \times 5}{20 \times 5} = \frac{45}{100}$$

0.39

46%

 $\frac{2}{5}$

$$\frac{46}{100}$$

$$\frac{2 \times 2}{5 \times 2} = \frac{4}{10} = 0.4$$

0.450

0.390

0.460

0.400

3

1

4

2

In Ans space always write original numbers.

Answer 0.39 $\frac{2}{5}$ $\frac{9}{20}$ 46% [2]
smallest

Always make 1 extra decimal place than given value.

21 Arrange these values in order of size, starting with the smallest.

$$\frac{9}{20} \times \frac{5}{5} = \frac{45}{100}$$

0.39

$$46\% = \frac{46}{100}$$

$$\frac{2}{5} \times \frac{2}{2} = \frac{4}{10} = 0.4$$

0.450

③

0.390

①

0.460

④

0.400

②

Note: In answer space, always write original ones.

Answer 0.39 $\frac{2}{5}$ $\frac{9}{20}$ 46% [2]
smallest

(b) Arrange these fractions in order, beginning with the smallest.

Try to make
denominators
Same:

$$\frac{4}{5} \times \frac{8}{8}$$

$$\frac{3}{4} \times \frac{10}{10}$$

$$\frac{31}{40} \times \frac{1}{1}$$

$$\frac{32}{40}$$

$$\frac{30}{40}$$

$$\frac{31}{40}$$

③

①

②

Answer $\frac{3}{4}$, $\frac{31}{40}$, $\frac{4}{5}$ [1]
smallest

53 Arrange these numbers in order, starting with the smallest.

$$\frac{3}{4}$$

0

-1

$$-\frac{17}{20} \times \frac{5}{5} = -\frac{85}{100}$$

$$-\frac{4}{5} \times \frac{2}{2} = -\frac{8}{10}$$

0.750

0

-1

-0.850

-0.800

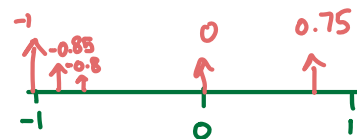
⑤

④

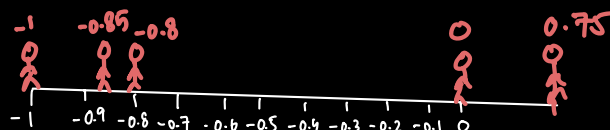
①

②

③



Answer -1 , $-\frac{17}{20}$, $-\frac{4}{5}$, 0 , $\frac{3}{4}$ [2]
smallest



59 (a) James thinks of a **two-digit** number.

It is a cube number.

It is an even number.

What is his number?

1
8
27
64 → even
125
216
343
512
729
1000

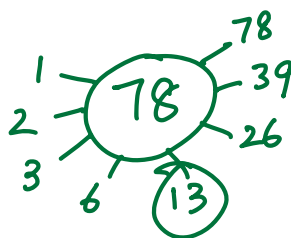
Answer 64 [1]

(b) Omar thinks of a **two-digit** number.

It is a factor of 78.

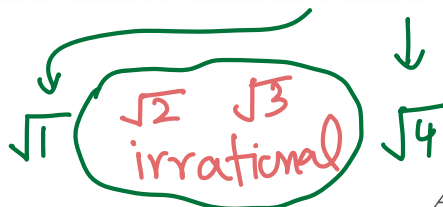
It is a prime number.

What is his number?



Answer 13 [1]

(c) Write down an irrational number between 1 and 2.



Answer $\sqrt{2}$ [1]

$0.66666\ldots$
↑
+1

0.6

0.6

0.66

0.67

2 Decimal Places

3 Decimal Places

0.60, 0.67, 0.66, 0.67

└──────────┘

These two are
same. You cannot
arrange.

0.600, 0.667, 0.660, 0.670

①

③

②

④

3dp

0.66666

↑
+1

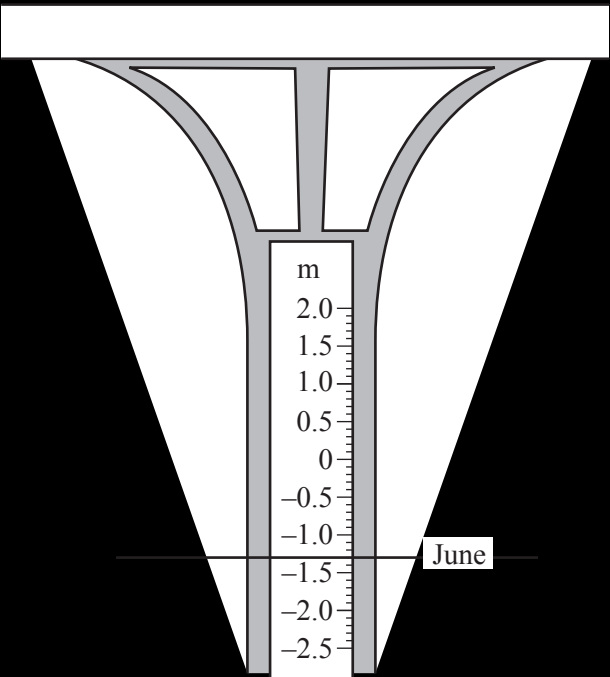
0.667

Statement	True or False	Example (if false)
$n^3 > 1$		
$\frac{1}{n} > \frac{1}{n^2}$		
$(n - 1)(n + 3)$ is always odd		

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Vostok												
London												

	Asia	Africa	Europe	South America
Highest point (m)				
Lowest point (m)				

58 The diagram shows a scale used to measure the water level in a river.



The table shows the reading, in metres, at the beginning of each month.

Month	January	February	March	April	May	June	July
Reading (m)	0.8	1.2	1.3	0.5	-0.1		-1.9

(a) The diagram shows the water level at the beginning of June.

Complete the table with the June reading. [1]

(b) Work out the difference between the highest and lowest levels shown in the table.

Answerm [1]

(c) The August reading was 0.4 m higher than the July reading.

Work out the reading in August.

Answerm [1]

72 Write these numbers in order of size, starting with the smallest.

$$\frac{13}{20} \quad 0.7 \quad \frac{7}{12} \quad 0.64 \quad \frac{5}{8}$$

Answer [2]
smallest

73 Omar has a pack of number cards.
He picks these five cards.



(a) Write down the mode of the five numbers.

Answer [1]

(b) He takes another card from the pack.

(i) If the mean of the six numbers is -1 , what number did he pick?

Answer [1]

(ii) If the difference between the highest and lowest of the six numbers is 12,
what are the **two** possible numbers he could have picked?

Answer or [1]

78 (a) Evaluate $(2.05 + 1.4) \times 0.2$.

Answer [1]

(b) Evaluate $1\frac{1}{3} - \frac{4}{5}$.

Answer [1]

79 The table shows some information about the temperatures in a city.

Date	Maximum temperature	Minimum temperature
1 February	-10°C	$T^{\circ}\text{C}$
1 March	4°C	-5°C

(a) Find the difference between the maximum and minimum temperatures on 1 March.

Answer $^{\circ}\text{C}$ [1]

(b) The minimum temperature, $T^{\circ}\text{C}$, on 1 February was 13 degrees lower than the minimum temperature on 1 March.

Find T .

Answer $T =$ [1]
